

The Periodic Table

<i>IA</i> H 1 1.01																	<i>VIIIA</i> He 2 4.00	
<i>IIA</i> Li 3 6.94	Be 4 9.01											<i>IIIA</i> B 5 10.81	<i>IVA</i> C 6 12.01	<i>V</i> N 7 14.01	<i>VIA</i> O 8 16.00	<i>VIIA</i> F 9 19.00	Ne 10 20.18	
Na 11 22.99	Mg 12 24.31			<i>IIIB</i>	<i>IVB</i>	<i>VB</i>	<i>VIB</i>	<i>VIIIB</i>	<i>VIIIB</i>	<i>VIIIB</i>	<i>IB</i>	<i>IIB</i>	<i>IIIA</i> Al 13 26.98	<i>IVA</i> Si 14 28.09	<i>V</i> P 15 30.97	<i>VIA</i> S 16 32.07	<i>VIIA</i> Cl 17 35.45	Ar 18 39.95
K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	Br 35 79.90	Kr 36 83.80	
Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (97.9)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29	
Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.85	Re 75 186.21	Os 76 190.2	Ir 77 192.22	Pt 78 195.08	Au 79 197.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.2	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)	
Fr 87 223.02	Ra 88 226.03	Ac 89 227.03	Rf 104 (261)	Db 105 (262)	Sg 106 263	Bh 107 (262)	Hs 108 (265)	Mt 109 (266)	Ds 110 (271)	Rg 111 (272)	Uub 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)				
Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97					
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08	Fm 100 257.10	Md 101 (257)	No 102 259.10	Lr 103 262.11					

Some Formula and Constants:

$$\begin{aligned}
 c &= 2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1} \\
 h &= 6.626 \times 10^{-34} \text{ J}\cdot\text{s} \\
 N &= 6.023 \times 10^{23} \text{ mol}^{-1} \\
 1 \text{ nm} &= 1 \times 10^{-9} \text{ m} \\
 1 \text{ L} &= 1 \times 10^3 \text{ mL} \\
 1 \text{ kHz} &= 1 \times 10^3 \text{ Hz}
 \end{aligned}$$

SID

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Last _____

First _____

<p>Question 1 7 Points</p>	<p>a) How many significant figures are there in each of the following numbers? 0.927790 _____ 0.060464 _____ 1.00×10^3 _____</p> <p>b) There are 12 eggs in a dozen. A farm produces 747 dozen eggs a month, how should the number of eggs per month be reported? _____</p> <p>c) The number 447.496 rounded to 4 significant figures is: _____</p>						
<p>Question 2 4 Points</p>	<p>a) When 17.2 is subtracted from 45.58, the result should be reported with digit(s) _____ after the decimal point.</p> <p>b) When 85.49 is divided by 59.6, the answer should be reported to significant _____ digit(s).</p>						
<p>Question 3 3 Points</p>	<p>A copy of your chemistry textbook is found to have a volume of 2.81×10^3 mL. Using unit analysis, show what the volume of this copy of your chemistry textbook is in L.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 5px 0;"> <tr> <td style="padding: 2px;">1 g = 1000 mg</td> <td style="padding: 2px;">1000 mL = 1 L</td> <td style="padding: 2px;">100 cm = 1 m</td> </tr> <tr> <td style="padding: 2px;">1000 mg = 1 g</td> <td style="padding: 2px;">1 mL = 1 cm³</td> <td style="padding: 2px;">1000 mm = 1 m</td> </tr> </table> <p>No need to do the calculation - just set up the correct dimensional analysis conversions - you may not need to fill in all the boxes.</p> <div style="text-align: center; margin: 10px 0;"> $2.81 \times 10^3 \text{ mL} \frac{\text{_____}}{\text{_____}} \times \frac{\text{_____}}{\text{_____}}$ </div>	1 g = 1000 mg	1000 mL = 1 L	100 cm = 1 m	1000 mg = 1 g	1 mL = 1 cm ³	1000 mm = 1 m
1 g = 1000 mg	1000 mL = 1 L	100 cm = 1 m					
1000 mg = 1 g	1 mL = 1 cm ³	1000 mm = 1 m					
<p>Question 4 3 Points</p>	<p>A 0.0635 L sample of a liquid has a mass of 87.6 g. Identify it as either nonane (density = 0.719 g/mL) or iodoheptane (density = 1.38 g/mL). _____</p>						
<p>Question 5 3 Points</p>	<p>The element copper has two stable isotopes, copper-63 with an atomic mass of 62.93 amu and copper-65 with an atomic mass of 64.93 amu. From the atomic weight of Cu = 63.54 one can conclude that:</p> <ul style="list-style-type: none"> <input type="checkbox"/> copper-65 has the highest percent natural abundance <input type="checkbox"/> both isotopes have the same percent natural abundance <input type="checkbox"/> most copper atoms have an atomic mass of 63.54 <input type="checkbox"/> copper-63 has the highest percent natural abundance 						
<p>Question 6 6 Points</p>	<p>A certain element consists of two stable isotopes. The first has an atomic mass of 107 amu and a percent natural abundance of 51.8%. The second has an atomic mass of 109 amu and a percent natural abundance of 48.2%. What is the atomic mass of the element?</p> <div style="text-align: right; margin-top: 20px;"> amu </div>						

<p>Question 7 3 Points</p>	<p>Decide if the following statements are true (T) or false (F): You must get all three correct to obtain credit - no partial credit awarded.</p> <p>a) Protons and neutrons are equal in mass, but opposite in charge. _____</p> <p>b) The mass of a proton is about the same as the mass of a neutron. _____</p> <p>c) The electron acts as a buffer zone in the nucleus _____</p>
<p>Question 8 10 Points</p>	<p>The following questions pertain to the periodic table given at the front of this exam:</p> <p>a. The atomic number for the element that is in group 4A and period 2? _____</p> <p>b. The atomic weight for the element in group 3A and period 4? _____</p> <p>c. Check the elements that would be expected to have similar properties?</p> <p><input type="checkbox"/> Pb <input type="checkbox"/> Cl <input type="checkbox"/> Be <input type="checkbox"/> I <input type="checkbox"/> Rn</p> <p>d. What is the symbol of the alkali metal that is in period 5? _____</p> <p>e. Check any of the following that are metals? (Z = atomic number)</p> <p><input type="checkbox"/> Fe (Z=26) <input type="checkbox"/> N (Z=7) <input type="checkbox"/> Br (Z=35) <input type="checkbox"/> Ba (Z=56) <input type="checkbox"/> None of these</p>
<p>Question 9 3 Points</p>	<p>Order the following (from 1-3) in order of the greatest force of attraction: (1 being the greatest and 3 the smallest)</p> <p>a) K^+ and Cl^- separated by a distance of 347 pm _____</p> <p>b) Ca^{2+} and S^{2-} separated by a distance of 347 pm _____</p> <p>c) K^+ and I^- separated by a distance of 412 pm _____</p>
<p>Question 10 8 Points</p>	<p>Give the correct formula for the following polyatomic ions:</p> <p>a) Phosphide _____</p> <p>b) Phosphate _____</p> <p>c) Dihydrogen phosphate _____</p> <p>d) Ammonium _____</p>
<p>Question 11 8 Points</p>	<p>a. Name the compound with the formula MgS? _____</p> <p>b. Name the compound with the formula $Fe(NO_2)_2$? _____</p> <p>c. What is the formula for sodium hydrogen carbonate? _____</p> <p>d. What is the formula for copper(II) sulfite? _____</p>
<p>Question 12 4 Points</p>	<p>How many atoms of sulfur are present in 4.37 moles of S_2F_{10}? <u>Show Work</u></p> <p style="text-align: right;"> atoms of S</p>

Question 13
4 Points

How many **moles** of fluorine are present in 1.73×10^{22} molecules of O_2F_2 ? Show Work

mol F

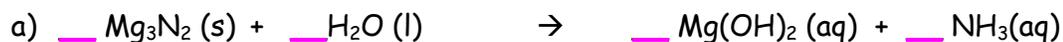
Question 14
6 Points

A compound is found to contain **45.71% oxygen** and **54.29% fluorine** by weight and a molecular weight of $70.00 \text{ g}\cdot\text{mol}^{-1}$. What is the **formula** of this compound? Show Work

Show Work

Question 15
6 Points

When the following molecular equations are balanced using the **smallest possible integer coefficients**, the values of these coefficients are:



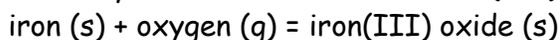
b) When aqueous solutions of barium hydroxide, $Ba(OH)_2$, and nitric acid, HNO_3 are combined, **barium nitrate** and **water** are formed.



Question 16

4 Points

An iron nail rusts when exposed to oxygen. According to the following reaction, how many **moles of oxygen** gas are necessary to form **0.632 moles iron(III) oxide**?



mol oxygen gas

Question 17

6 Points



a) Put the following forms of electromagnetic radiation in order of **increasing frequency**:

- Gamma ray
- Ultraviolet
- Radio wave

1. Lowest Frequency
2. Second Highest Frequency
3. Highest Frequency

b) Put the following forms of electromagnetic radiation in order of **increasing energy**:

- AM
- Microwave
- FM

1. Smallest Energy
2. Second Highest Energy
3. Highest Energy

Question 18

4 Points

A local AM radio station broadcasts at a frequency of **636 kHz**. Calculate the wavelength in **meters** at which it is broadcasting.

Show Work

m

Question 19

8 Points

The wavelength of a particular color of red light is **529 nm**. What is the **energy** of this light in **J.mol⁻¹**?

Show Work

J.mol⁻¹

Do Not Write Below This

Exam I Score